<The Amendment under PCT Article 34 made on January 31, 2006>

Written Amendment
(Amendment made based on Article 11 of Law Concerning the International Application of the Patent Cooperation Treaty and Related Matters, equivalent to Article 34 (2) (b) of Patent Cooperation Treaty)

To Commissioner of the Patent Office
(To Examiner)

1. Indication of the International Application

PCT/JP2005/006273

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4. Object of amendment
Specification and Claims

5. Date of the notification
12.07.2005

6. Content of amendment

(1) Amend the content of an underlined part at the first page and the second page of the present specification

A greater part of a suspension loaded in a hard disk drive (hereinafter referred to as HDD) has been replaced from a suspension of a wire type which has so far been used to a suspension of a wiring integration type which is stabilized in an ascending force and a position accuracy toward a disk which is a storage medium as a higher capacity is expedited. The above wiring integration type includes a type called a TSA (trace suspension assembly) method in which a laminate of a stainless foil-polyimide resin-copper foil is used and in which this laminate is processed into a prescribed form by etching processing (etching for circuit formation).

A TSA system suspension makes it possible to readily form a flying lead by using an alloyed copper foil having a high strength in the form of a laminate with stainless and a resin. Such laminate is widely used because of a high freedom in shape processing (circuit formation), a relatively low cost and a good dimensional accuracy. In this regard, a laminate for an HDD suspension obtained by forming a polyimide base resin layer and a conductive layer in order on a stainless substrate has already been disclosed (refer to, for example, a patent document 1). Described therein are those in which a linear expansion coefficient of the polyimide resin layer and an adhesive force between the polyimide resin layer and the

conductive layer are prescribed in order to prepare a laminate suited to a laminate for an HDD suspension.

Patent document 1: WO98/08216

(2) Amend the content of an underlined part at the third page of the present specification

Intensive investigations repeated by the present inventors in order to solve the above problems have resulted in coming to complete the present invention by obtaining a laminate and then subjecting a conductive layer to chemical etching to reduce a conductor thickness. That is, the present invention relates to a laminate for an HDD suspension comprising a stainless layer, polyimide resin layer, and conductive layer, wherein a thickness of the conductive layer is 10 μm or less, and a surface roughness (Ra) of the conductive layer is 0.15 μm or less.

(3) Amend an underlined part in Claims at the seventeenth page of the present specification and delete Claim 3

1. (amended) A laminate for an HDD suspension comprising a stainless layer, polyimide resin layer, and conductive layer, wherein a thickness of the conductive layer is 10 μm or less, and a surface roughness (Ra) of the conductive layer is 0.15 μm or less.

3. (deleted)

7. List of the appended documents:

(1) Amended Description

Pages 1, 2 and 3 One copy for each

(2) Amended Claims

Pages 17 and 18 One copy for each

DESCRIPTION

LAMINATE FOR HDD SUSPENSION AND PROCESS FOR PRODUCING THE SAME

Technical Field

The present invention relates to a laminate used for an HDD suspension and a process for producing the same.

Background Art

A greater part of a suspension loaded in a hard disk drive (hereinafter referred to as HDD) has been replaced from a suspension of a wire type which has so far been used to a suspension of a wiring integration type which is stabilized in an ascending force and a position accuracy toward a disk which is a storage medium as a higher capacity is expedited. The above wiring integration type includes a type called a TSA (trace suspension assembly) method in which a laminate of a stainless foil-polyimide resin-copper foil is used and in which this laminate is processed into a prescribed form by etching processing (etching for circuit formation).

A TSA system suspension makes it possible to readily form a flying lead by using an alloyed copper foil having a high strength in the form of a laminate with stainless and a resin. Such laminate

is widely used because of a high freedom in shape processing (circuit formation), a relatively low cost and a good dimensional accuracy. In this regard, a laminate for an HDD suspension obtained by forming a polyimide base resin layer and a conductive layer in order on a stainless substrate has already been disclosed (refer to, for example, a patent document 1). Described therein are those in which a linear expansion coefficient of the polyimide resin layer and an adhesive force between the polyimide resin layer and the conductive layer are prescribed in order to prepare a laminate suited to a laminate for an HDD suspension.

Patent document 1: WO98/08216

Disclosure of the Invention

However, the existing situation is that a thin copper foil of 10 μm or less has not yet been put into practical use because of the problems of a handling property in a copper foil production step and a laminate production step and a cost. Usually, it is produced by forming an insulating layer comprising a polyimide resin on a stainless foil and then laminating later a commercial copper foil as a conductive layer by heating and pressing. Accordingly, a thin conductive layer of 10 μm or less has difficulty in the handling property and the cost each described above, and the existing situation is that a laminate for an HDD suspension having a thin conductive layer is not materialized.

In light of the above existing situations, an object of the present invention is to provide a laminate for an HDD suspension which has a thin conductive layer and is free of warpage (camber) and deformation and which meets requirement for an HDD suspension provided with a high density and superfine wiring and has a high reliability and a high precision and a production process for the same.

Intensive investigations repeated by the present inventors in order to solve the above problems have resulted in coming to complete the present invention by obtaining a laminate and then subjecting a conductive layer to chemical etching to reduce a conductor thickness. That is, the present invention relates to a laminate for an HDD suspension comprising a stainless layer, polyimide resin layer, and conductive layer, wherein a thickness of the conductive layer is 10 μm or less, and a surface roughness (Ra) of the conductive layer is 0.15 μm or less.

Also, it relates to the laminate for an HDD suspension, wherein the conductive layer is an alloyed copper foil having a strength of 500 MPa or more and an electric conductivity of 65 % or more.

Further, the present invention relates to a production process of a laminate for an HDD suspension, wherein a laminate comprising a stainless layer, polyimide resin layer, and conductive layer is produced using the conductive layer having a thickness

What is claimed is:

1. (amended) A laminate for an HDD suspension comprising a stainless layer, polyimide resin layer, and conductive layer, wherein a thickness of the conductive layer is 10 μm or less, and a surface roughness (Ra) of the conductive layer is 0.15 μm or less.

2. The laminate for an HDD suspension as described in claim 1, wherein the conductive layer is an alloyed copper foil having a strength of 500 MPa or more and an electric conductivity of 65 % or more.

3. (deleted)

4. A production process of a laminate for an HDD suspension, wherein a laminate comprising a stainless layer, polyimide resin layer, and conductive layer is produced using the conductive layer having a thickness of larger than 10 μm, and thereafter only the conductive layer is subjected to chemical etching to thereby reduce a thickness of the conductive layer to 10 μm or less.

5. The production process of a laminate for an HDD suspension as described in claim 4, wherein the conductive layer is an alloyed

copper foil having a strength of 500 MPa or more and an electric conductivity of 65 % or more.

6. The production process of a laminate for an HDD suspension as described in claim 4, wherein the laminate after subjected to chemical etching is subjected to supersonic treatment in an alkaline solution.

7. The production process of a laminate for an HDD suspension as described in claim 5, wherein the laminate after subjected to chemical etching is subjected to supersonic treatment in an alkaline solution.

8. The production process of a laminate for an HDD suspension as described in any of claims 4 to 6, wherein the conductive layer after subjected to chemical etching has a surface roughness (Ra) of 0.15 μm or less.